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Issue:	3
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Module

Retrospective and Other Amendments

Endorsement and Authorisation

For endorsement, authorisation and issue record of this document, please refer to the SSI Applications Manual Contents, NR/L2/SIG/17002

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User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – *No variations, could stop the railway*

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Amber requirements – *Controlled variations, approved risk analysis and mitigation*

- **Amber requirements shall** be complied with unless variation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Variations **may** be permitted. Variations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** variations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Green – *Guidance*

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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Issue record

Issue	Date	Comments
2	August 2004	2 nd Issue
3	05/09/2015	AMD 04/01 (7) incorporated

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 06/12/2015.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

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1 Introduction

As SSI has been applied to more signalling schemes, SSI design and data documentation has evolved to include more applications, address changes in signalling standards, correct deficiencies and improve methods. This document provides a comprehensive list of documentation changes and assists in identifying those which may require retrospective action.

2 Purpose and Scope

The purpose is to:

- list all amendments to SSI design documents [SSI8003](#) "SSI Data Preparation" and [SSI8500](#) "Design of SSI Signalling Schemes"
- to advise which of these may need to be applied retrospectively to existing SSI signalling schemes
- to give guidance in identifying whether these have been applied to existing SSI signalling schemes

Also included for completeness are any on-site SSI programs issues, linked to the above, that may also need to be installed retrospectively.

The scope is limited as follows:

- This document is intended for use by those engineers experienced in the application of SSI. Sections 1 to 5 are also intended for use by persons with some signalling knowledge although assistance may be required from more experienced engineers.
- The Amendments listed include all changes made to SSI design documents [SSI8003](#) since February 1989, and [SSI8500](#) since May 1990, up to those included in the SSI Applications Manual as defined in Issue Two of [RT/E/S/17002](#).
- Amendments listed as "Retrospective" comprise those where SSISPG has identified that retrospective action may need to be taken. This is generally limited to retrospection arising out of deficiencies in published scheme design or data - it does not cover retrospection arising out of changes to Signalling Standards or where earlier unpublished scheme design or data does not match that subsequently issued in [SSI8003](#) or [SSI8500](#).
- Guidance is given on the symptoms of any problems addressed by Retrospective Amendments and on how to recognise whether approved solutions have been applied, but deciding whether retrospective action needs to be taken is outside the scope of this document.

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3 Amendment System

3.1 History

Following the pre-1989 issues of the [SSI8003](#) suite of documents and the 1990 issue of [SSI8500](#), subsequent amendments were defined in formally issued specific Amendment documents. These defined the changes made and also gave the reasons and implementation policy for each change. The documents were periodically updated to these Amendments and re-issued.

Amendments were given reference numbers, the first two digits indicating the year of issue of the document(s) they were amending.

This continued through the 89/xx and both 90/xx series of Amendments up to Amendment 91/8. After this, any Amendments were not formally issued, these now being used solely for document change control by the SSI Signalling Principles Group as part of the process of updating these documents.

3.2 Dates of Formal Issue of SSI8003, SSI8500 and Amendments

These are the dates on which these documents were formally issued, i.e. distributed, to the various bodies that were entitled to receive them. They are not necessarily the dates shown on the actual documents, these dates being detailed in Section 6.

ISSUED DOCUMENT	DATE
SSI8003 Amendments 89/1 to 89/18	Jun. 1989
SSI8003 Amendments 89/19 to 89/33	Nov. 1989
SSI8500 Issue A	Nov. 1989
SSI8003 Amendments 89/34 to 89/50	Feb. 1989
SSI8003 1990 full re-issue	Feb. 1989
SSI8003 Amendment A90/1	Apr. 1990
SSI8003 Amendments A90/2 to A90/10	Jun. 1990
SSI8003 Amendments A90/11 to A90/19	Nov. 1990
SSI8500 Amendment E90/15	Apr. 1991
SSI8003 Amendments A90/20 to A90/41	Jun. 1991
SSI8003 1991 full re-issue	Jun. 1991
SSI8003 Amendment 91/1, 91/2, 91/5 & 91/6	Jan 1992
SSI8003 Amendment 91/7 & 91/8	Apr. 1992
SSI8500 Amendments E90/1 to E90/14, E90/16 to E90/27	Apr. 1992
SSI8500 Issue B	Apr. 1992
SSI8003 & SSI8500 full re-issue as listed in RT/E/S/17002 Issue One	May 1996
SSI8003 & SSI8500 part re-issue as listed in RT/E/S/17002 Issue Two	Dec. 1996
Part re-issue as listed in RT/E/S/17002 Issue Three	Apr. 1998
Part re-issue as listed in RT/E/S/17002 Issue Four	Feb. 1999
Part re-issue as listed in RT/E/S/17002 Issue Five	Aug. 1999

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Part re-issue as listed in RT/E/S/17002 Issue Six	Aug. 2000
Part re-issue as listed in RT/E/S/17002 Issue Seven	Feb. 2001
Part re-issue as listed in RT/E/S/17002 Issue Eight	Jun. 2001
Major revision as listed in RT/E/S/17002 Issue Nine	Feb. 2002
Part re-issue as listed in RT/E/S/17002 Issue Ten	Apr. 2002
Part re-issue as listed in RT/E/S/17002 Issue Eleven	Jun. 2002
Additional new sections as listed in RT/E/S/17002 Issue Twelve	Dec. 2002

Note that the prefixes "A" (as in DATA) & "E" (as in DESIGN), applied to the above 90/xx series Amendment reference numbers for [SSI8003](#) and [SSI8500](#) respectively, have been added purely for the purpose of distinguishing elsewhere in this document between these Amendments.

4 List of Retrospective Amendments

The list is prepared in subject order, relating it to the Amendment number, and gives the effect of the change and the implication of not making the change. Where practical, guidance is given on how to detect whether the Amendment has been applied. All Amendments in the time period covered are listed in Section 6, but only those which may need to be retrospectively applied are listed here as Retrospective Amendments.

The following should be noted when using this Section:

- Earlier SSI signalling schemes were commissioned with the earlier Amendments such as 89/xx, E90/xx & A90/xx already issued and thus incorporated. However, care should be taken in the use of the year in the Amendment references when ascertaining whether such a scheme is affected. Although 89/xx Amendments were published in 1990 and the two 90/xx series of Amendments between 1990 and 1992, some 91/xx Amendments were not published until 1996. (Section 3.2 lists publication dates.) Additionally, in some schemes there was considerable delay between scheme/data design and the eventual commissioning of the scheme.
- For later schemes, the CISR should indicate which issues and Amendments of [SSI8003](#) & [SSI8500](#) have been used (see [SSI8505](#) "SSI Data Procedures", Chapter C).
- All recognition features given assume that the changes have been fully and correctly made.
- The "Applicable Document Sections" entries relate to the issue number of the document where the change was first applied. Subsequent changes to the applicable documents are not referenced unless the applicable document has changed completely (for example if the subject in question was subsequently moved to a different document).mes, the CISR should indicate which issues and Amendments of [SSI8003](#) & [SSI8500](#) have been used (see [SSI8505](#) "SSI Data Procedures", Chapter C).

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* These Amendments were never formally issued as separate documents, but they may have been used on an advance draft information basis prior to the formal issue of [SSI8003](#) & [SSI8500](#).

** These Amendment reference numbers have been created purely for cross referencing purposes within this document.

Document Reference: SSI8151-003

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4.1 Programs and Compilers

4.1.1 Data/program/compiler compatibility checks

Amendment Refs.: 91/7, 91/16* Items 2 & 3, 96/1** Items 2 & 3, 98/1, 99/21

Problem summary: Not a problem as such, but these checks are mandatory for all new data and for existing data when either the data or associated on-site data processing programs are next changed.

Recognition feature: This check has been done if Part 6 of the Central Interlocking Software Record for the version of data concerned has been endorsed as such.

Applicable document Section(s): [SSI8003-54](#) Issue Two all Sections

4.2 Hardware and Circuit Design Changes

4.2.1 Sleeving of wire-wrapped sockets

Amendment Ref.: 92/5* Item 6

Problem summary: Failure, by contractor new to SSI, to sleeve sockets of the wire wrapping type provided in the free connectors for PMs, SMs or LDTs, thus potentially allowing the sockets to make electrical contact with each other or with the connector shroud.

Recognition feature: This problem has been addressed if such sockets have been sleeved.

Applicable document Section(s): [SSI8500G](#) Issue Two Section 3.1

4.2.2 Separation of wire types

Amendment Ref.: 92/5* Item 8

Problem summary: The use of PVC covered wires to [DEF STAN 61-12](#) Part 6 type 3 (typically used for connections to Modules) and PCP covered wires to standard [GS/ES 0872](#) (typically used for tail cables) in close proximity can lead to the deterioration of PCP insulation.

Recognition feature: This problem has been addressed if the white and pink PVC wires are not in contact with the black PCP insulated wires.

Applicable document Section(s): [SSI8500G](#) Issue Two Section 3.1

4.2.3 High voltages on Points Module Pump Motor Outputs

Amendment Ref.: E90/17 Item 2

Problem summary: For Points Modules pump motor outputs brought out onto outgoing cable termination links, the open-circuiting of these links can cause excessively high voltages of over 300 volts to be present on the links. A 20 kohm resistor (or equivalent) is required across all such pump motor outputs to ensure that such voltages are kept within the normal operating limits. There is no problem with valve outputs, such voltages remaining below 120 volts.

Recognition feature: This problem has been addressed if such a resistor is in place.

Applicable document Section(s): [SSI8500D](#) Issue Two Section 4.1

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4.3 Data Links

4.3.1 Data link surge protection

Amendment Ref.: E90/19, 99/34

Problem summary: Vulnerability of SSI equipment to lightning strikes. Data link surge protection units have been developed by Telematic and Furse. Further guidance on the general issue of earthing and bonding has been provided by the introduction of [SSI8503](#) "Earthing and Bonding of SSI Equipment" and its subsequent re-issue at Issue 2.

Recognition feature: This problem has been addressed if such units have been fitted.

Applicable document Section(s): [SSI8500I](#) Issue One Section 2.3, [SSI8503](#) Issue Two.

4.3.2 Minimising reflected signals on data links

Amendment Ref.: E90/27

Problem summary: Reflected signals ("blips") on Trackside Data Links can result in message loss in communications between an Interlocking and its TFM's. These can arise due to equipment or cable faults, or in normal working where the latest standards are not being used. In the latter situation, experience has shown that the incidence of these blips is increased and thus reliability is reduced.

The latest standards require that the Interlocking and DLM repeater pairs are only connected to the extremities of data link sections, and that data link sections do not share DLMs at DLM repeater pairs. Other measures to reduce blip problems are the upgrading of earlier schemes to the scheme 2B category (thus using improved communications programs) and the use of MkIII DLMs to modification state 2 at DLM repeater pairs.

Recognition feature: This problem has been addressed if the above has been carried out.

Applicable document Section(s): [SSI8500D](#) Issue Two Section 7.1

4.4 Route Setting, Locking and Releasing

4.4.1 Alternative route setting

Amendment Ref.: 96/3** Item 2

Problem summary: This applies only to route requests for alternative routes that are "chained", i.e. if the preferred alternative route fails, this initiates the setting of a lesser preferred alternative. Such request are applicable if they are split into two or more parts (including those that are split because the route crosses one or more Interlocking boundaries). Points, which are subsequently required in a different direction by a lesser preferred route, may be subject to double movement. If they are, then with Interlocking MPM program SSI4303-D4 (or later issue) installed or retrofitted, the included test employed to avoid the Newcastle double point movement problem will cause a lesser preferred alternative to fail to set first time. See also Section 5.3.

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Recognition feature: This problem has been addressed if any commands for the calling of points, which are subsequently required in a different direction by a lesser preferred route, are situated in the final part of the route setting request in all but that for the least preferred route.

Applicable document Section(s): [SSI8003-63](#) Issue Two Section 6

4.4.2 Protection against erroneous panel requests

Amendment Ref.: A90/30

Problem summary: As the Panel Processor is not a safety critical system, it is conceivable (although unlikely) that a fault could result in an incorrect panel request number being received by the Interlocking MPMs. If this were to match the identity number for one of the internally generated requests used to lock and unlock routes across interlocking boundaries, a possible wrong-side failure could result.

To eliminate this risk, the Interlocking MPM program issue SSI4303-D3 (and thus D4 and any subsequent issues) has been modified to carry out an additional check on the validity of incoming panel requests from the panel processor. For this to be effective requires the special key-word "INTERNAL" in the QST identity file to indicate the boundary between the two types of panel requests. This data change may be done before the new program issue is retro-fitted.

Recognition features: This problem has been addressed as far as the data change is concerned if the special key-word "INTERNAL" is present in the QST identity file.

Applicable document Section(s): [SSI8003-10C](#) Issue One Section 3.4

4.4.3 Approach locking release for slots

Amendment Ref.: A90/27

Problem summary: The route holding maintained by a slot may be prematurely released by the pulling of the entrance button immediately after the slot is given, i.e. before the "slot-normal" proving from the other signal box is destroyed. The data solution is to enforce a ten second delay in approach locking release if the slot is button cancelled without a train having entered the slotted route.

Recognition features: This problem has been addressed if a ten second delay is enforced in the Approach Lock Release data for the slot.

Applicable document Section(s): [SSI8003-51B](#) Issue On Section 3.5.2

4.5 Control and Replacement of Signal Aspects

4.5.1 Last wheel replacement

Amendment Ref.: 89/12

Problem summary: A signal with last wheel replacement is ready to clear except for approach controls which require the berth track circuit occupied for time. A train overruns the signal at red, without satisfying the approach controls at which point the signal clears. This is due to the last wheel conditioning being by the signal ready-to-clear controls rather than by signal off.

Recognition features: This problem has been addressed if the last wheel conditioning in the aspect control data for the signal is done by signal actually off.

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Applicable document Section(s): [SSI8003-10G](#) Issue Two Section 1.2.4

4.5.2 Replacement of Distant & Banner Repeater Signals

Amendment Ref.: 89/24

Problem summary: Applies only to distant or banner repeater signals that repeat a signal with last wheel replacement and prove berth track circuit of this signal clear. Depending on data order, the distant or banner repeater signal can briefly flash "off" as rear of train clears this track circuit. Problem cured by changing data (and control tables) such that distant or banner repeater signal proves this track circuit clear for two seconds. This data solution for distant signals is not required if controlled by the signal aspect sequence command and Interlocking MPM program issue SSI4303-D3 (or later issue) is fitted (see also the next Section and Section 5.1).

Recognition features: This problem has been addressed if the control tables and data have been changed as above.

Applicable document Section(s): [SSI8003-62](#) Issue One Section 3.1 and [SSI8003-67](#) Issue One Sections 5.3 & 7.3

4.5.3 AWS suppression

Amendment Ref.: 89/29, 99/12

Problem summary: Where AWS suppression is required then this should be initiated by the route requiring the suppression being set, and not just by the appropriate sub-route locked, to avoid the suppression being wrongly applied if an Interlocking powers up with a Mode 1 or 2 start.

Recognition feature: This problem has been addressed if a latch "L<signal>SUPP" has been used to control the suppression.

Applicable document Section(s): [SSI8003-76](#) Issue 2. (the guidance was originally given in [SSI8003-10G](#) but has subsequently been moved to a separate document).

4.5.4 Aspect sequencing

Amendment Ref.: A90/22 & 91/17* Item 6

Problem summary: A signal is approach controlled. Its berth track circuit fails and the signal clears. On clearance of the failure, the data for the signal in rear is processed first and this results in the signal in rear, on clearing, briefly displaying an aspect less restrictive than the required single yellow. The main solution is the use of the signal aspect sequence command data type wherever applicable with this data type always appearing first in any data constructs where special sequencing is involved such as consecutive double yellows. This data type, together with Interlocking MPM program SSI4303-D3 (or later issue), ensures that, on the clearance of a track circuit failure that has approach controlled a signal, the signal in rear, if immediately clearing, is held (if it can) at single yellow long enough (one major cycle) to avoid this problem. For signals that cannot use this data type, such as banner repeater signals, the aspect has to be delayed by requiring the berth track circuit of the signal ahead clear for two seconds (see also the previous Section and Section 5.1).

Recognition features: This problem has been addressed if the above solutions have been implemented.

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Applicable document Section(s): [SSI8003-10G](#) Issue Two Section 1.2.7 and [SSI8003-67](#) Issue One Sections 5.3 & 7.3

4.5.5 Emergency Signals On and Signal Group Replacement Controls

Amendment Ref.: E90/18 Item 1, 01/20

Problem summary: Originally the Emergency Signals On Control was only mandatory for IECC controlled Central Interlockings, the Railway Inspectorate requiring this in event of an emergency arising where VDU failure made the "button" replacement of individual signals impossible. [SSP62](#) Issue 1.2, [GK/RT0025](#) Issue 1 Section 7, and [RT/E/S/10131](#) Issue 1 now require this control for all schemes, and additionally a "Signal Group Replacement" control to enable to the signaller to replace groups of signals via a conventional panel or IECC interface.

Recognition feature: This change has been addressed if the above controls have been provided.

Applicable document Section(s): [SSI8500F](#) Issue One Section 2

4.6 Point Controls and Detection

See also Section 4.8.2

4.6.1 Double point movement ("Newcastle problem")

Amendment Ref.: 96/3** Item 1

Problem summary: This problem is primarily covered by a program change rather than by data change, see Section 5.3. There are data implications where some data is either no longer required, see Sections 4.6.2 and 4.8.4, or where data changes are required before the program is changed, see Section 4.4.1.

Recognition feature: See Section 5.3.

Applicable document Sections: [SSI8003-10E](#) Issue Two Section 2 covers the subject generally, but see also the above mentioned Sections.

4.6.2 Self-normalising points (variant of "Newcastle problem")

Amendment Ref.: 91/13* Item 3 & 96/3** Item 3

Problem summary: Points may be called both ways in quick succession, first by self-normalisation and secondly by a route requiring the points reverse. This problem can result in the signal requiring the points reverse clearing, immediately being replaced, and then re-clearing once the points have reached their final position. This is a variation of the "Newcastle problem".

Recognition feature: This problem has been addressed if a timer identity named E<points>RDEL is present in the OPT data file (this delays the clearing of the signal), or Interlocking MPM program issue SSI4303-D4 (or later issue) has been installed (this initially causes the route setting to fail). See also Section 5.3.

Applicable document Section(s): [SSI8003-66](#) Issue Two Section 3.2.3

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4.6.3 Point Keying

Amendment Ref.: 89/8

Problem summary: Moving of point keys to centre position not logged on Technician's Terminal tape.

Recognition feature: Data for point key centre request present in PBK data file.

Applicable document Section(s): [SSI8003-20C](#) Issue One Section 5.1

4.6.4 Matching Points Availability Tests and Commands

Amendment Ref.: 89/14

Problem summary: It is essential that every point command (call) must be matched by a points availability test in order to avoid points being wrongly moved. A specific check for this is required, this being especially important where data sub-routines or split panel requests are used or after data alterations.

Recognition features: There are none as such, a retrospective check being required on earlier schemes if this check had not been done.

Applicable document Section(s): [SSI8003-10E](#) Issue Two Section 3.1, [SSI8003-52](#) Issue Two Section 3.1 and [SSI8505C](#) Issue Four Section 2

4.7 Track Sections

See also Section 4.11.4.

4.7.1 HVI, reed track circuits and axle counter sections - operating times

Amendment Refs.: E90/10 & A90/13

Problem summary: Where adjacent track circuits are such that the pick up time for one is less than the drop away time for the other (for example where one or both track circuits are GEC ALSTHOM HV Impulse type or Reed) then the built-in delay in the CI declaring the first track circuit clear may be insufficient to ensure that at any time at least one of the track circuits is registered as occupied by the Interlocking as a short train passes from the first to the second. This problem may also arise when passing from a track circuit to an axle counter section.

One method of increasing this delay is to use Interlocking data to further delay by one major cycle the Interlocking declaring the first track circuit clear. Another method is to employ one or more slow-to-pick repeater relays (TPRs) as an interface between the first track circuit and the SSI.

Recognition feature: This problem has been addressed if one or more slow-to-pick repeater relays (TPRs) are provided as an interface between the first track circuit and the SSI, or the IPT data file entry that inputs the first track circuit, typically "T<tc_name> <bit_no.> either includes the word "del" or is surrounded by three conditional statements operating on the track circuit's memory.

Applicable document Sections: [SSI8500D](#) Issue Two Section 3.3.5 and [SSI8003-10E](#) Issue Two Section 1.5

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4.8 Overlaps

4.8.1 Swinging overlaps (signal replaced)

Amendment Ref.: 89/20

Problem summary: Situation where a signal requiring an overlap has its clearing delayed due to route indicator lamp proving or because it is a cross Interlocking boundary route. If overlap is swung whilst signal is in process of clearing then signal may oscillate on and off.

Recognition features: This problem has been addressed if the proving of the detection of the swinging facing points in the overlap is conditioned out by signal ready to clear rather than signal off. The cross boundary situation has been addressed if a latch "L<boundary>ASP(M)" has been used for this conditioning in the Exit Interlocking.

Applicable document Section(s): [SSI8003-51C](#) Issue Two Section 1.5, [SSI8003-65B](#) Issue One Sections 3.5 & 4.5 and [SSI8003-65C](#) Issue One Sections 1.5 & 2.5

4.8.2 Overlap release

Amendment Refs.: 95/4**

Problem summary: For controlled signals, when a route is released for whatever reason the TISP ("train in section proving") code is left set at its last value, this being zeroed when the route is next set. Some overlap releasing tests the TISP code for the exit signal at 2 in order to prove train has entered the overlap. Thus in certain circumstances it is possible for overlap locking to be wrongly freed.

Recognition feature: In the FOP data file, each test for any signal's TISP code at 2 in sub-overlap release data is accompanied by a test for the same signal's approach locking not free.

Applicable document Section(s): [SSI8003-63](#) Issue Two Section 4

4.8.3 Swinging overlaps (alternative execution clauses)

Amendment Ref.: 91/25* Item 7

Problem summary: Data in an alternative execution clause (as used for swinging overlaps) not matching the initial availability tests led an incident on an overseas administration where trailing points were thrown under a train.

Recognition feature: There are no simple recognition features, i.e. ensuring that the problem is not present requires a data check. (Additional emphasis has been added in [SSI8003](#) on checks required where an alternative execution clause is used with a default command as the final alternative.) This problem is unlikely to arise on Network Rail infrastructure because of different overlap principles.

Applicable document Section(s): [SSI8003-65D](#) Issue Two Section 4

4.8.4 Preferred swinging overlaps (variant of "Newcastle problem")

Amendment Refs.: 91/25* Item 10 & 96/3** Item 4

Problem summary: Problem with preferred overlaps where hinge points are called both ways in quick succession by the route requiring the overlap and the forward route. This problem resulted in the signal requiring the overlap immediately being

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replaced, and re-clearing once the points reached their final position. This is a variation of the "Newcastle problem".

Recognition feature: This problem has been addressed if a timer identity named E<points>RDEL is present in the OPT data file (this delays the clearing of the overlap-requiring signal, and of the junction signal if not approach controlled), or Interlocking MPM program issue SSI4303-D4 (or later issue) has been installed (this initially causes the forward route setting to fail). This data solution was further updated (96/3 item 4) to cover the second point call being initiated by point keying rather by forward route setting (the program change does not address this option). This can be recognised by the use of the above timer identity in the PRR file data for the keying of these points. See also Section 5.3.

Applicable document Section(s): [SSI8003-65D](#) Issue Two Section 2.2

4.8.5 Non-permitted swinging overlaps ("Wembley incident")

Amendment Refs.: 95/3**

Problem summary: A serious incident occurred at Wembley where facing points wrongly moved ahead of a train. This arose through incorrect control tables and data for the swinging overlap situation where a forward route led through overlap hinge points, and then through a subsequent set of facing points in the direction that the overlap was not permitted to be swung or set to.

Recognition feature: In the above non-permitted overlap situation, see Technical Investigation Report [95026](#) Appendix E for both data checking and testing methods for checking for the presence of this problem.

Applicable document Section(s): [SSI8003-65D](#) Issue Two Section 3

4.9 Junction Signalling

4.9.1 Flashing aspects

Amendment Refs.: 91/1 & 91/20* Item 3

Problem summary: This applies to flashing aspects where measures are taken in the approach control to yellow of the junction signal to ensure that the driver will see the previous signal at flashing yellow beforehand. The momentary failure of the junction signal berth track circuit with the train just past the signal in rear can result in the junction signal clearing to and staying at Y, but only if there is more than one track circuit between these signals.

Other problems are the failure of the yellow lamp of the junction signal resulting in this and the signal in rear cycling on and off, and the junction signal failing to stay off, or cycling, where the signal in rear is in a different Interlocking.

Recognition features: The first problem has been addressed if in the junction signal data in the OPT data file a latch named L<sig>YS or L<route>OFFS has been used, where <sig> is the junction signal and <route> is the route at the junction signal for which the flashing yellow is being provided. The latter latch indicates that the latest method is being used, in which case the third problem has also been addressed. The second problem has been addressed if, in the same data, a latch named L<sig>YOUT has been used.

Applicable document Section(s): [SSI8003-69B](#) Issue Two Section 4.3

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4.10 Panels and Multiplexers

4.10.1 Erroneous PMUX inputs: Signals wrongly clearing ("post-Newton change")

Amendment Ref.: 91/2

Problem summary: PMUX single input error wrongly clearing signal. This includes inputs from:

- Emergency replacement buttons.
- Buttons for Signals controlled by single button.
- CCTV L.C. "Crossing Clear" buttons (where inputted into a SSI via a PMUX).

Both the pushing and release of the button, detected on separate PMUX inputs, is now required for button operation to be acted upon.

Recognition feature: This problem has been addressed if an identity named B<function>TMZ has been provided and has been used for this function in the PBK data file. This is for the second PMUX input for the button that detects when the button is released, i.e. TM or M contact made. (For Crossing Clear buttons, alternatively these button contacts can be repeated to the level crossing and cycled in the level crossing's circuitry.)

Applicable document Section(s): [SSI8003-20B](#) Issue One Section 4.2 and [SSI8003-20C](#) Issue One Section 5.3

4.10.2 Erroneous PMUX inputs: Point keying ("post-Newton change")

Amendment Refs.: 91/5 & 91/8

Problem summary: PMUX single input error wrongly causing points, held in a required position by points key switch only:

- Being wrongly moved to the other position.
- Having points key switch locking wrongly removed, thus allowing points to be wrongly route called to the other position.

All keying of points now requires the point key switch to have just previously been reported in the centre position, and a minimum of two erroneous PMUX point key switch inputs to the SSI has to occur before either of the two at-risk situations above can arise.

Recognition feature: This problem has been addressed for the points concerned if an identity named E<points>KC has been used for this function in the PRR data file.

Applicable document Section(s): [SSI8003-10E](#) Issue Two Section 3.2

4.10.3 Erroneous PMUX inputs: Signal replacement by Signaller ("post-Newton change")

Amendment Ref.: 91/6

Problem summary: PMUX input via signal button FM contact being continuously broken and thus preventing a signal being button replaced, whether a controlled signal or an emergency replaced automatic signal.

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Recognition feature: This problem has been addressed for the signal concerned if a data statement is present in the POD data file that includes =QXS<signal>.

Applicable document Section(s): [SSI8003-20C](#) Issue One Section 4.3.3

4.10.4 Panel to Panel Multiplexer cabling ("post-Newton change")

Amendment Refs.: E90/21 & 92/2*

Problem summary: Vulnerability of this cabling to electrical interference or mechanical damage. This is addressed by the positioning of the PMUX relative to the panel such that the cable routing is optimised and the cabling length minimised. Also the cables shall use earthed screens and be of a particular type. Existing cables may only be used if of correct type and in good condition. Other measures may also be required.

Recognition feature: This problem has been addressed if an inspection has been made and, if required, the above has been carried out.

Applicable document Section(s): [SSI8500F](#) Issue One Section 3

4.11 Interlocking Boundaries

4.11.1 Split route-setting acknowledgement requests

Amendment Ref.: 89/35, 99/1, 01/01

Problem summary:

Where acknowledgement requests are split, if route setting fails in other than the final part request then the cancelling of the already set portion of route in the exit Interlocking may not be initiated. This problem will occur if there is no "else" clause containing the initiating data.

A subsequent and related problem occurred whereby, if the first acknowledgement from the exit interlocking failed to result in the route setting in the entrance interlocking, a repeated acknowledgement from the exit interlocking can result in the route being set and the signal cleared in the entrance interlocking with the route released in the exit interlocking.

An interim data solution was published with amendment 99/1, and the final and more comprehensive solution in amendment 01/01.

Recognition features:

In respect of the initial problem, acknowledgement route setting requests are split and, in any of the non-final parts, an "else" clause containing data to initiate route locking release in the exit Interlocking is missing.

In respect of the second problem, the end of an acknowledgement route setting request should be examined. For the interim solution, the telegram timer EGxx is set to 8 instead of being stopped. For the final solution a telegram acknowledgement timer EGxxAK is present.

Network Rail has carried out a survey to identify those boundaries where the risk justifies remedial action, and thus can be expected to initiate any such action.

Applicable document Section: [SSI8003-51C](#) Issue Four Section 1.2